The Egyptian Journal of Radiology and Nuclear Medicine (2014) **45**, 959–967

Egyptian Society of Radiology and Nuclear Medicine

The Egyptian Journal of Radiology and Nuclear Medicine

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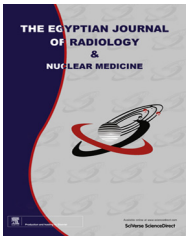

ORIGINAL ARTICLE

The role of multidetector CT virtual hysterosalpingography in the evaluation of female infertility

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Received 15 December 2013; accepted 3 April 2014
Available online 29 April 2014

KEYWORDS

Multide;
Tector computed tomography virtual hysterosalpingography (MDCT VHSG);
Hysterosalpingography (HSG);
Infertility

Abstract *Purpose:* To assess the role of 64-row multidetector computed tomography virtual hysterosalpingography (MDCT VHSG) in the evaluation of the female reproductive tract in infertile patients and compare it with conventional X-ray hysterosalpingography (HSG).
Methods and material: The studied group included 25 patients with infertility. All patients were evaluated with 64-row MDCT VHSG and X-ray HSG. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of both examinations for uterine pathology, fallopian tube pathology and per lesion pathology were calculated. The duration for both examinations, patient discomfort and patient effective dose were documented.
Results: The mean duration for MDCT VHSG and X-ray HSG was 6.5 ± 1.9 and 26.9 ± 2.9 min respectively, MDCT VHSG has a significantly less median patient discomfort and mean patient effective dose. Sensitivity, specificity, PPV and NPV for uterine pathology were 100%, 100%, 100% and 100% respectively for MDCT VHSG and 90%, 93.3%, 90% and 93.3% respectively for X-ray HSG, the inter-method agreement for uterine pathology was $k = 0.83$. Sensitivity, specificity, PPV and NPV for the detection of fallopian tube pathology were 100%, 93%, 91 and 100% respectively for MDCT VHSG and 100%, 86%, 85% and 100% respectively for X-ray HSG and $k = 0.76$. Sensitivity,

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Peer review under responsibility of Egyptian Society of Radiology and Nuclear Medicine.

 http://dx.doi.org/10.1016/j.ejrnm.2014.04.005

specificity, PPV and NPV for per patient pathology were 100%, 91%, 93% and 100% respectively for MDCT VHSG and 87%, 80%, 87% and 80% respectively for X-ray HSG and $k = 0.75$.
Conclusion: MDCT VHSG could be an excellent new alternative diagnostic procedure in the infertility assessment workup.

1. Introduction

With the rapid growth in the infertility services, there is a demand for parallel growth in the female infertility imaging (1,2). Over the past decade, rapid growth in the multi-detector computed tomography technology permits volumetric data acquisition which enabled isotropic imaging quality with high spatial, temporal and contrast resolution, resulting in a marked improvement in the quality of two and three dimensional reconstructions and the virtual endoscopic evaluation of smaller structures (3,4).

Multi-detector CT virtual hysterosalpingography is a non invasive, novel modality that combines the technique of conventional X-ray HSG with the advanced technology of MDCT, resulting in a significant improvement in the visualization and assessment of fallopian tubes and allowing a more accurate evaluation of elevated lesions of different sizes being competitive with hysteroscopy, in addition to its ability to evaluate extra uterine pelvic pathology as ovarian cyst and mass (5).

The aim of this study was to assess the role of 64-row MDCT VHSG in the evaluation of the female reproductive tract in infertile patients and compare it with conventional X-ray HSG.

2. Materials and methods

2.1. Study population

The study was done in the Ain Shams University Hospital and specialized private center in Cairo during the period from October 2011 till November 2013. Twenty-five infertile patients were included in this study. The women were examined on day 7–10 of their menstrual cycle with no contraindications for HSG. The study was performed after approval of the Ethics committee of scientific Research, faculty of medicine, Ain Shams University and after taking consent from all patients.

2.2. Technique of the MDCT virtual hysterosalpingography

MDCT virtual hysterosalpingography was obtained using 64-row MDCT (Toshiba aquilion 64 V3.30ER003) with the following technical parameters: collimation: 64×0.5 mm; slice thickness: 0.5 mm; reconstruction interval: 0.3 mm; average scan time: 4 s; 120 kV; 120–200 mAs; rotation time: 0.55 s; mean patient effective dose: 3.54 ± 0.6 milisievert (mSv).

The patient was positioned supine on the CT table in a lithotomy position. After the perineum was cleansed with povidone-iodine solution, the vagina was dilated with speculum; the cervix was also cleansed with povidone-iodine solution. Then with the speculum in place a scout view of the pelvis was obtained. The localizer was adjusted to localize small field of view avoiding unnecessary large field to avoid excess radiation exposure.

Next, without cervical clamping a specially designed plastic cannula was fitted in the external cervical os and 10–20 ml of diluted (1–5 mL contrast agent diluted with 9–15 mL saline solution) nonionic, low osmolar contrast media (Iobitridol; Xentix 300 mg I/ml) was instilled slowly into the cervical canal to avoid rapid expansion of the uterus which might cause patient discomfort, the average time of MDCT VHSG scan after contrast injection was 4 s.

2.3. Post processing tools

Original CT data were transferred to a workstation (Vitrea 2 version 4.1.14.0) and then reprocessed using many processing tools such as; maximum intensity projections (MIPs) which created images similar to conventional HSG by increased thickness of the slab, and multiplanar reconstructions (MPR) in coronal, sagittal, oblique and curved images to unfold the uterus and improve visualization of the uterine cavity and cervical canal, also Virtual endoscopic images could be created which showed the lumen of uterus, cervix and fallopian tube, in addition to three-dimensional volume rendering reconstructions which facilitated visualization of uterine external contour.

2.4. Technique of the X-ray hysterosalpingography

An X-ray HSG was carried out on the same day or one day later after the MDCT VHSG with a Dinan 1000 X-ray unit. The patient was positioned in a lithotomy position on the radiology fluoroscopy table. A sterile speculum was inserted into the vagina after the perineum was cleansed with povidone-iodine solution, and the cervix was also cleansed with a povidone-iodine solution. Cervical clamping was used and a single toothed tenaculum applied to the anterior lip of the cervix. The metal cannula was then placed into the cervix, and the HSG was performed. Both radioscopy and spot radiographs were acquired during the injection of 10–20 mL of water-soluble iodine-contrast material (ioxitalamate; Telebrix Hystero) until the diagnosis was obtained. Four to five spot radiographs were obtained with 70–90 kV and 12–16 mAs. First, a scout radiograph was done. The dye was then instilled slowly to avoid rapid uterine expansion and patient discomfort, and to allow for early images to be obtained before the dye entered the peritoneal cavity allowing better evaluation of the uterine cavity and fallopian tubes, and the second spot radiograph was then taken. The third spot radiograph was performed after removing the speculum to evaluate cervical canal and fallopian tube patency. The last image was taken 5 min after asking the patient to turn on her side to demonstrate intra-peritoneal adhesion. The mean patient effective dose was 6.13 ± 0.3 mSv.

After the patient had undergone both procedures she was asked to complete a questionnaire about the grade of discomfort during the procedures (G0 no discomfort, G1 mild discomfort, G2 moderate discomfort, and G3 severe discomfort). The patient effective dose and the duration of examination of both procedures were also documented.

3. Data analysis

The interpretation of each diagnostic procedure was performed by a different radiologist in a blinded fashion as regards:

- Presence of any lesion causing infertility.
- Type and location of the lesion.
- Patency of fallopian tubes.

Then a reference final result was created; after the final diagnosis was achieved, the radiologist reexamined the X-ray images and also reviewed the images of MDCT VHSG (unblinded X-ray HSG). This method resulted in creation of an improved reference final result.

The examination duration, patient discomfort and radiation dose of each procedure were recorded and a comparison was made between both procedures as regards these items.

4. Statistical methods

Statistical analysis was done on a personal computer using MedCelc© version 12.5 (MedCalc© Software bvba, Ostend, Belgium) and DAG stat (Mackinnon, 2000). The paired t test was used to compare paired numerical data, if normally distributed. For skewed paired data, the Wilcoxon signed ranks test was used.

To determine the diagnostic value of HSG or MDCT VHSG, a series of 2×2 contingency tables were constructed to contrast the examination tool of interest to the final reference result. The following measures were then calculated: sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV).

Agreement between examination tools was examined using Cohen's kappa coefficient (κ).

5. Results

Twenty-five female patients with diagnosis of infertility underwent both MDCT VHSG and X-ray HSG. No adverse events occurred during both procedures. The mean patient age was 29.12 ± 5.5 years. Of the 25 patients studied, 10 (40%) showed normal results by the reference final result. Pathologic findings based on the reference final result were as follows: uterine pathology ($n = 11$) and fallopian tube pathology ($n = 11$); and the detailed pathologies which were: submucosal myomas ($n = 2$); uterine synechiae ($n = 2$); uterine malformations ($n = 8$); right hydrosalpinx ($n = 1$); left hydrosalpinx ($n = 2$); right tubal obstruction ($n = 6$); left tubal obstruction ($n = 8$) and ovarian cyst ($n = 2$) (Table 1) (Figs. 1–5).

5.1. In the per lesion analysis

The reference final result revealed uterine synechiae that was missed on the first blinded X-ray HSG evaluation (expressed as false-negative result on the X-ray HSG analysis), and it also revealed uterine septum that was misdiagnosed as bicornuate uterus in the first blinded X-ray HSG evaluation. There were also two right tubal blockade that were revealed in the X-ray HSG yet the reference final result revealed patent tubes (expressed as false-positive results on the X-ray HSG analysis).There was also one right tubal blockade that was revealed in the MDCT VHSG yet the reference final result revealed patent tube (expressed as false-positive result on the MDCT VHSG analysis). Also the MDCT VHSG has revealed two ovarian cysts one was simple and the other was complicated, which wasn't detected in the X-ray HSG; this was advantage for MDCT VHSG over X-ray HSG.

5.2. In per patient results

The reference final results revealed 15 patients with pathological findings. The MDCT VHSG revealed only 14 patients with similar pathological findings as reference final result, and diagnosed one patient with incorrect (over diagnosed) pathological finding as compared to reference final result, which was expressed as false-positive result. On the other hand, the X-ray HSG revealed 13 patients with similar pathological findings as reference final result. And falsely misdiagnosed or missed pathological findings in two patients which were expressed as false-negative results. And also over diagnosed two patients with incorrect pathological findings, which were not existing in the reference final result and expressed as false-positive results.

Table 2 summarizes the diagnostic value of MDCT VHSG and X-ray HSG. MDCT VHSG has more sensitivity, specificity, PPV and NPV than X-ray HSG for uterine pathology, fallopian tubes pathology and per patient pathology.

The sensitivity for uterine pathology, fallopian tubes pathology and per patient pathology of MDCT VHSG was 100%, 100% and 100% respectively, yet of X-ray HSG was 90%, 100% and 87% respectively. Where specificity for uter-

Table 1 Summary of radiologic findings by X-ray HSG and MDCT VHSG, and ultimate diagnosis made by reference final.

		Reference final result		HSG		MDCT VHSG	
Radiologic finding		*n*	%	*n*	%	*n*	%
Uterine pathology	Positive	11	44.0	9	36.0	11	44.0
	Negative	14	56.0	16	64.0	14	56.0
Fallopian tube pathology	Positive	11	44.0	13	52.0	12	48.0
	Negative	14	56.0	12	48.0	13	52.0
Per patient examination	Positive	15	60.0	15	60.0	14	56.0
	Negative	10	40.0	10	40.0	11	44.0

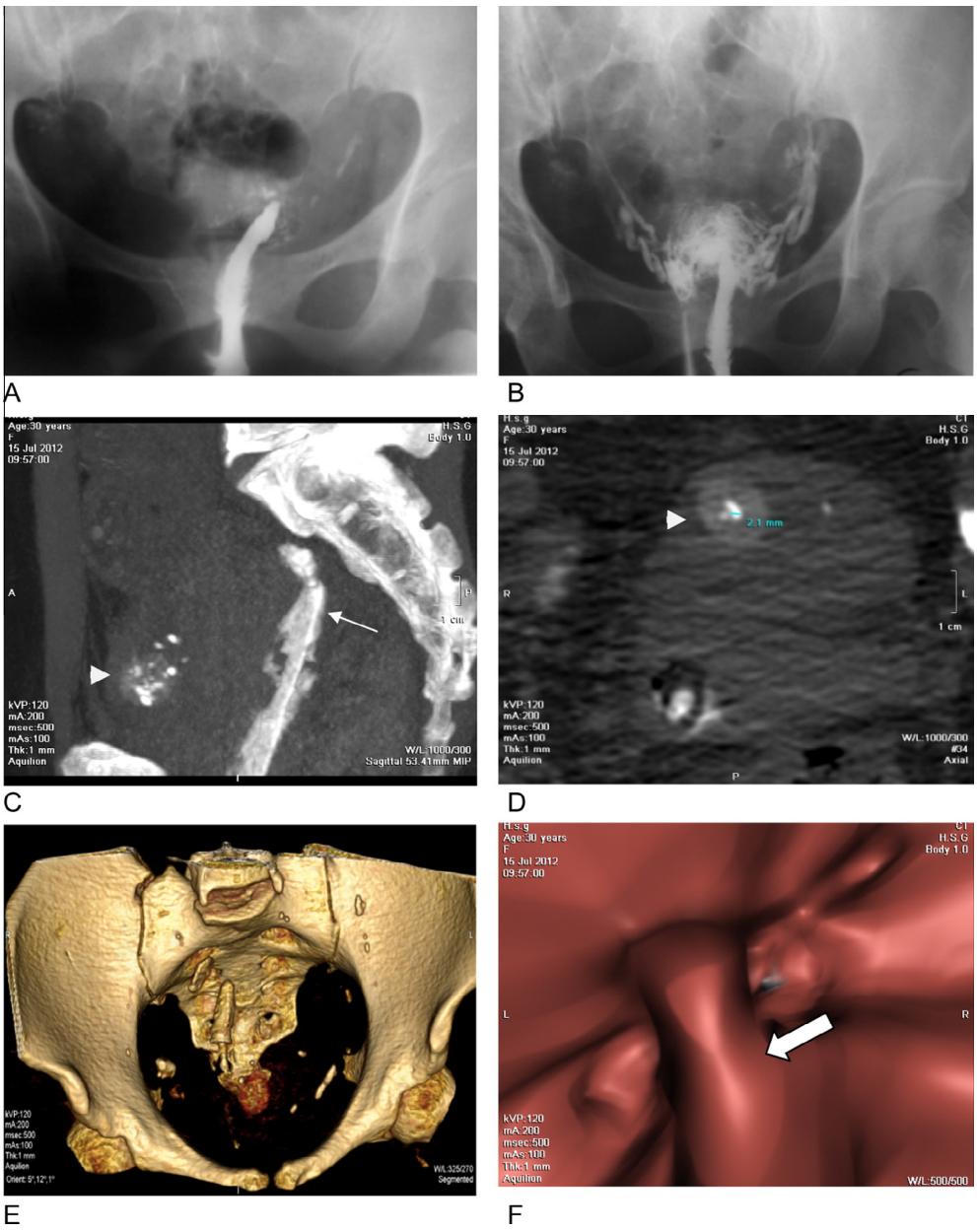

Fig. 1 Asherman's syndrome. (A and B) The X-ray HSG revealed opacification of the cervical canal with non opacified uterine cavity and extensive intravasation of the contrast media. The MDCT VHSG revealed opacification of the cervical canal (long arrow) with extensive intrauterine adhesion and synechiae (wide arrow) resulting in very small uterine cavity (2 mm) which was outlined by enhancing endometrial lining(arrow head). Intravasation into the uterine and iliac arteries also has occurred, (C and D) Maximum intensity projections. (E) Volume rendering reconstruction. (F) Virtual endoscopy view.

ine pathology, fallopian tubes pathology and per patient pathology of MDCT VHSG was 100%, 93% and 91% respectively, and of X-ray HSG was 93.3%, 86% and 80% respectively. PPV for uterine pathology, fallopian tubes pathology and per patient pathology of MDCT VHSG was 100%, 91% and 93% respectively whereas of X-ray HSG was 90%, 85% and 87% respectively, while NPV for uterine pathology, fallopian tubes pathology and per patient pathology of MDCT VHSG was 100%, 100%, and 100% respectively, whereas NPV of X-ray HSG was 93.3%, 100%, and 80% respectively. The inter-method agreement between MDCT VHSG and X-ray HSG for uterine pathology, fallopian tubes pathology and per patient pathology was $k = 0.83$, 0.76 and 0.75 respectively (Table 3).

The mean duration time of X-ray HSG and MDCT VHSG was 26.9 ± 2.9 min and 6.5 ± 1.9 min respectively, so there was a significant duration time reduction of 20.4 ± 1 min ($P < 0.0001$) in MDCT VHSG when compared with X-ray HSG.

The mean radiation dose of X-ray HSG and MDCT VHSG was 6.13 ± 0.3 mSv and 3.54 ± 0.6 mSv respectively, with a significant radiation dose reduction of 2.59 ± 0.3 mSv ($P < 0.0001$) in MDCT VHSG when compared with X-ray HSG. The median grade of patient discomfort during X-ray

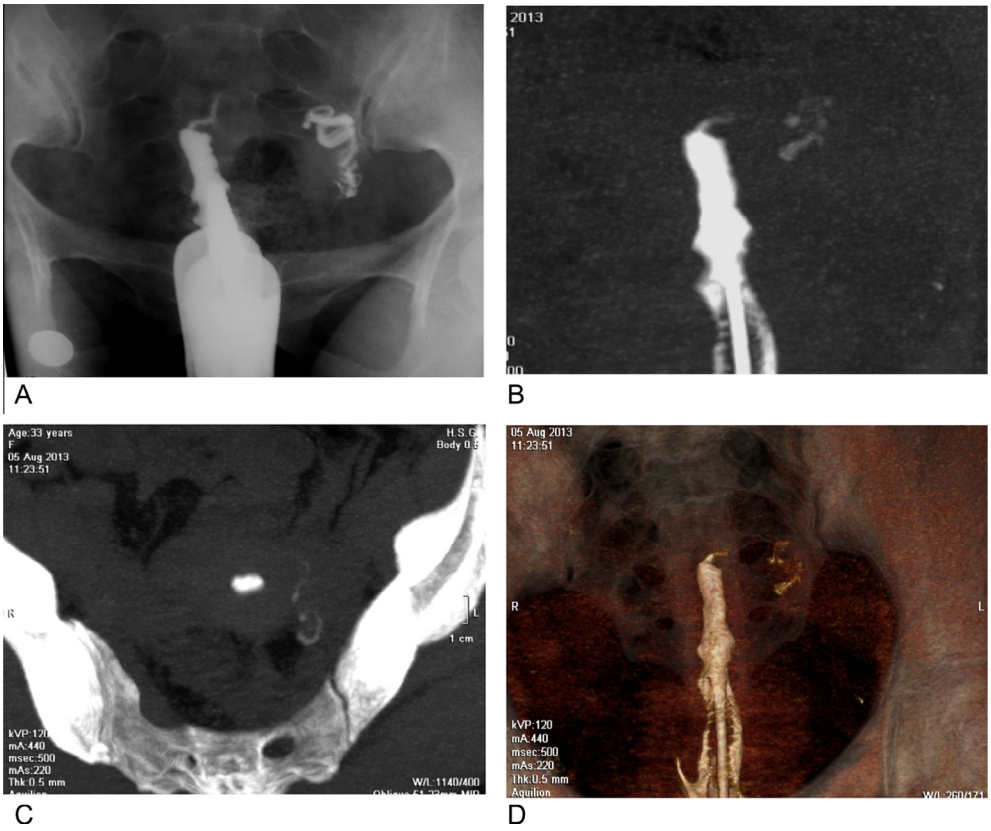

Fig. 2 Unicornuate uterus. (A) The X-ray HSG revealed Unicornuate uterus with single uterine horn and a single left fallopian tube. The MDCT VHSG revealed Unicornuate uterus with single uterine horn and a single fallopian tube. Although the wall has irregular outline yet there was no evidence of intrauterine adhesion (B and C) Maximum intensity projections. (D) Volume rendering reconstruction.

HSG (with cervical clamping) was 2(1–3), and during MDCT-VHSG (without cervical clamping) was 1(0–1) with a significant reduction ($p < 0.0001$) in patient discomfort grade (Table 4).

6. Discussion

The widely accepted techniques for the assessment of female reproductive system in the infertility workup include ultrasound (hysterosonography), HSG and hysteroscopy (6–8). The first evaluation performed by 16-row MDCT scanners showed some limitation in fallopian tube evaluation (3). Takeda et al. (9) and Akaeda et al. (10) used MDCT to produce virtual endoscopic images to examine patient with submucous myoma after expanding the uterine cavity with CO2, and they found that this technique can provide accurate preoperative data regarding site and size of lesion before hysteroscopic myomectomy.

Carrascosa et al. (11,12) reported that the MDCT VHSG was proposed to be a non invasive alternative diagnostic procedure for evaluation of female genital tract. The volumetric and isotropic CT data obtained with the 64-row MDCT allowed accurate virtual endoscopic examination of the uterus, cervix and fallopian tube. The MIPs, MPRs and three-dimensional volume rendering reconstructions combined with virtual endoscopic views of the endoluminal structure gave accurate evaluation of different female reproductive tract abnormalities with comparative diagnostic accuracy of the conventional X-ray HSG.

The usage of metal cannula in the MDCT VHSG had a drawback on the examination with beam hardening and streaking artifacts which hindered the proper assessment of the cervical canal. To overcome this problem there were two solutions available. First usage of a foley‘s catheter instead of the metal cannula but with balloon filling – to seal the cervix and avoid contrast leakage into the vagina – extra cervical distention was some time an issue causing patient discomfort and also obscuring part of the cervical canal. The second technique was usage of a plastic cannula; several models with different size were used to successfully fit with different sizes of external os and for proper sealing of cervical opening.

Carrascosa et al. ((3–5,11–13) have an excellent practice in MDCT VHSG examination, and they published many series in this aspect with the first evaluation was by 16-row MDCT which gave a good result comparable with conventional X-ray HSG for detection of uterine pathology. The next series was done by 64-row MDCT VHSG which reported good results comparable with conventional X-ray HSG for both uterine pathology and fallopian tube pathology. This current study results are in accordance with these results, and the diagnostic values of our 64-row MDCT VHSG were also comparable and even higher than those of conventional X-ray HSG, where the MDCT VHSG has more sensitivity and specificity for uterine pathology and per patient pathology, and has more specificity for fallopian tube pathology than X-ray HSG.

The MDCT VHSG has better diagnostic evaluation for intrauterine filling defects as intrauterine synechiae and polyp,

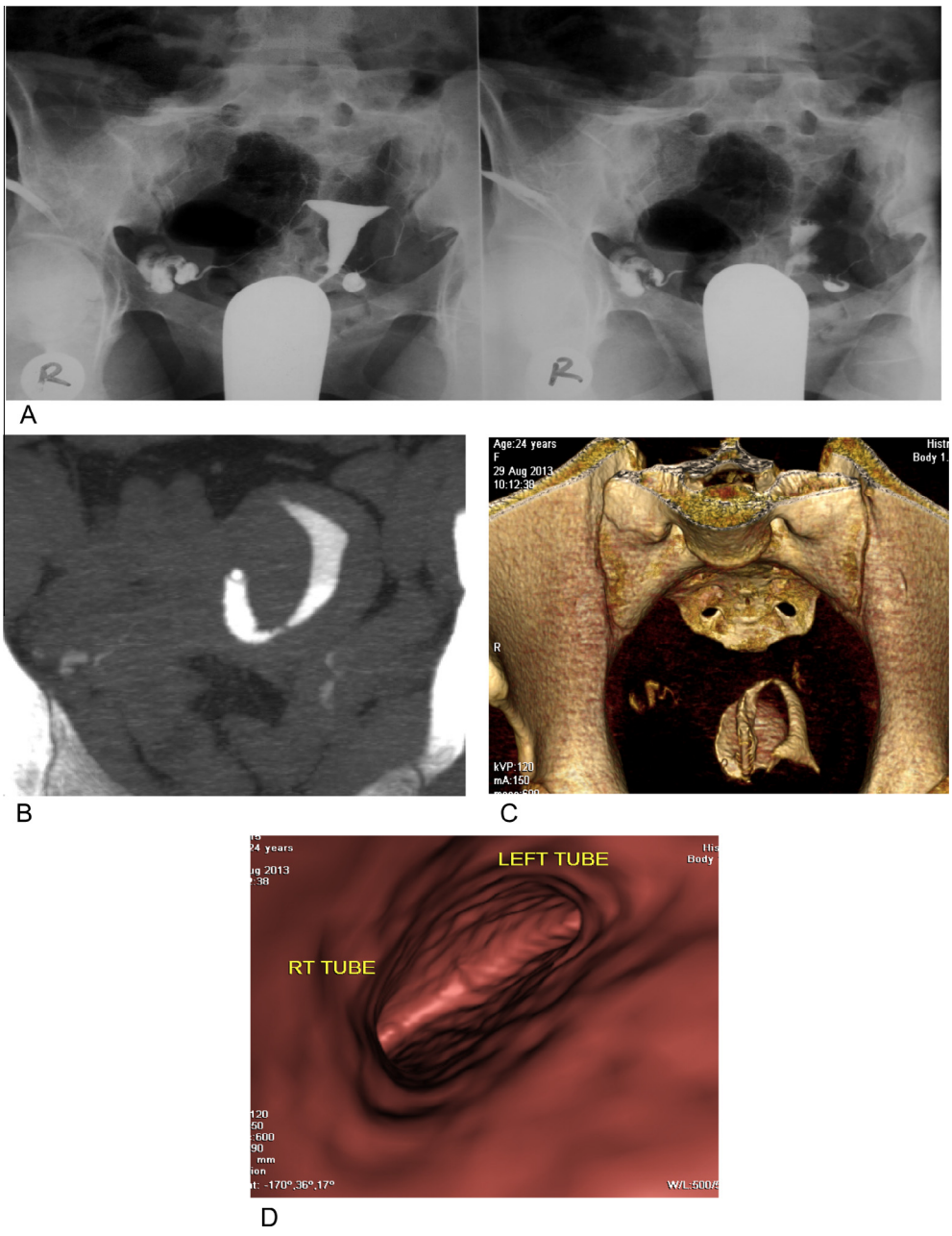

Fig. 3 Bilateral hydrosalpinx. (A) The X-ray HSG revealed bilateral hydrosalpinx. The MDCT VHSG revealed bilateral hydrosalpinx, (B) maximum intensity projections. (C) Volume rendering reconstruction. (D) Virtual endoscopic view.

with better evaluation of the submucous myoma regarding its size, site and precise depth (12), in addition to its ability to evaluate and define uterine contour adding to acutely diagnosing uterine malformation. There were two uterine pathology were undiagnosed or misdiagnosed by X-ray HSG in this study, yet the MDCT VHSG correctly diagnosed them, this could be explained by two reasons; the first, was the common diagnostic dilemma to differentiate between a septate and bicornuate uterus; The ability of MDCT VHSG to define contour, outer wall and myometrium of the uterus was superior to X-ray HSG making MDCT VHSG more accurate in differentiating between a septate and bicornuate uterus. The second one, was the better diagnostic value of virtual endoscopy provided by MDCT VHSG for detecting delicate uterine synechiae compared to the X-ray HSG where the dense contrast media may obscure such delicate lesions. The slightly higher specificity (100%) and PPV (100%) of MDCT VHSG for uterine pathology in current study over Carrascosa et al. (12) who reported specificity of 85.71% and PPV of 84.61% for uterine cavity, could be attributed to the higher number of uterine malformation ($n = 8$) and uterine synechiae ($n = 2$) in current study, in comparison to Carrascosa et al. (12) where there were less patients with uterine malformation ($n = 1$) and uterine synechiae ($n = 0$).

The slightly higher specificity of 64-row MDCT VHSG for uterine pathology in this study over 16-row MDCT VHSG examination in Carrascosa et al. (3) series is also consistent with authors result in their study; who also reported higher

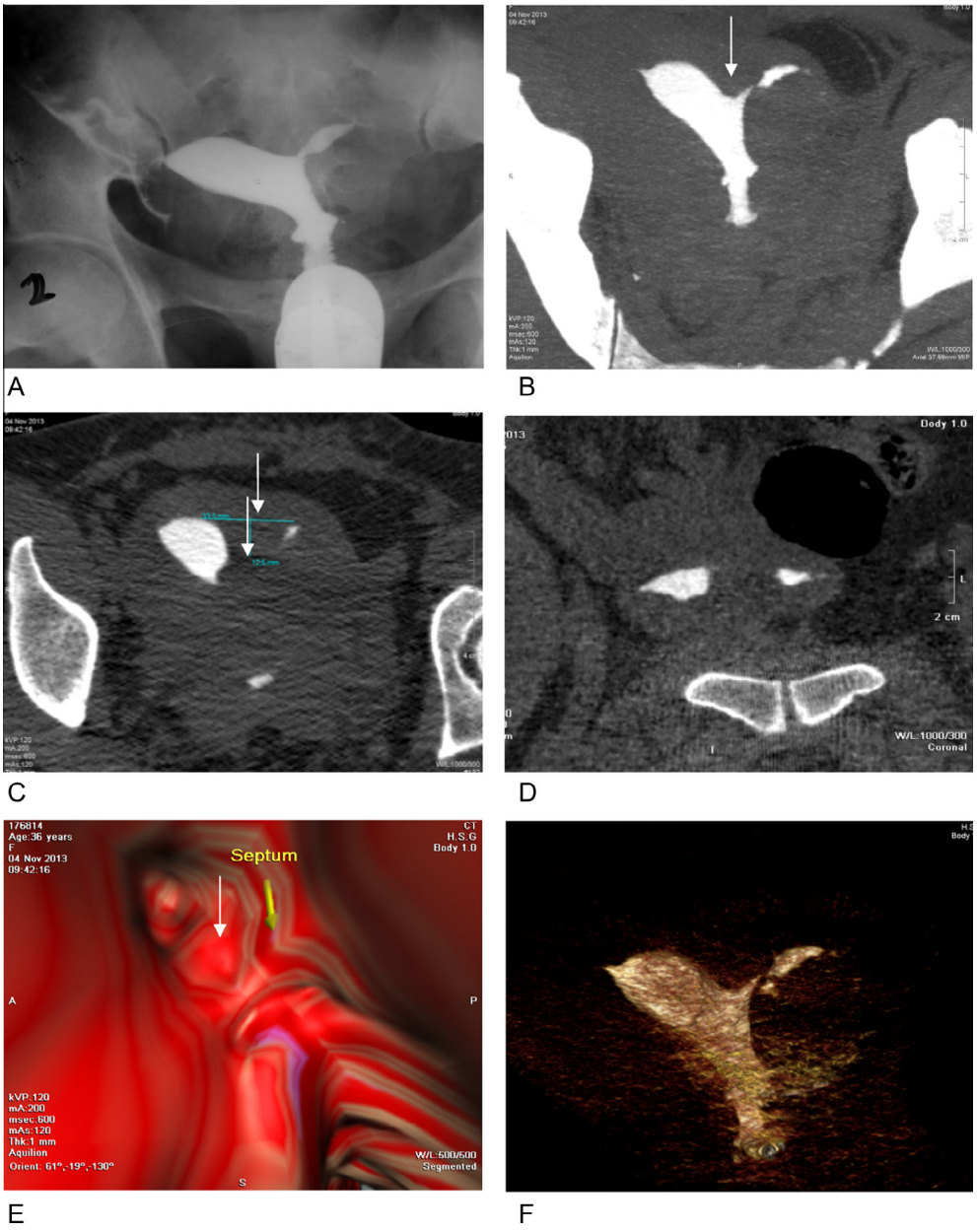

Fig. 4 Incomplete uterine septum with left tubal block. (A) The X-ray HSG revealed bicornuate uterus instead of incomplete uterine septum, there is left tubal block. The MDCT VHSG revealed incomplete uterine septum (arrow) measuring 3.3 × 13 mm (transverse and AP diameter), and bilateral tubal block. (B and C) Maximum intensity projections. (D) Axial cut showing uterine septum (arrow). (E) Virtual endoscopic views (F) Volume rendering reconstruction.

specificity for 64-row MDCT VHSG over 16-row MDCT VHSG for uterine pathology, denoting better diagnostic accuracy of 64-row MDCT over 16-row MDCT. The higher sensitivity and specificity for fallopian tube pathology in current study and other 64-row MDCT VHSG studies in Carrascosa et al. (3,12) over 16-row MDCT VHSG in Carrascosa et al. (3) can be attributed to that the fine small fallopian tube require higher 64-row MDCT resolution for better evaluation of such delicate structure.

In this study the inter-method agreement between MDCT VHSG and X-ray HSG was very good for uterine pathology; $K = 0.83$, and good for fallopian tubes pathology; $K = 0.76$, which was lower than the result of Carrascosa et al. (3) series who reported that the inter-method agreement between 64-row MDCT VHSG and X-ray HSG for uterine pathology and fallopian tubes pathology was very good where $K = 1$ and 1 respectively.

The lower inter-method agreement between 64-row MDCT VHSG and X-ray HSG in this study as compared to Carrascosa et al. (3) study was attributed to two reasons; First in the Carrascosa et al. (3) study the 64-row MDCT VHSG examinations were carried out only on ten patients and the authors assumed that the X-ray HSG examination was the standard examination with which they compared the result of MDCT VHSG which made their results of less diagnostic accuracy. Although; Carrascosa et al. (12) did not report the

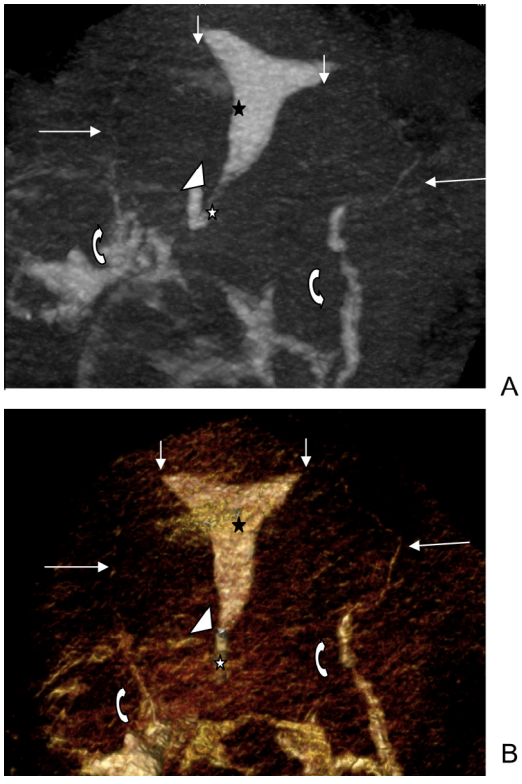

Fig. 5 Normal MDCT VHSG. Normal anatomy: The uterus has an inverted triangular shape. The isthmus (arrowhead) is the transition between the cervix (white asterisk) and the uterine body (black asterisk). The fallopian tubes can be divided into three segments: interstitial (short arrow), isthmic (long arrow), and ampullary (curved arrow). (A) Maximum intensity projection. (B) Volume rendering reconstruction.

inter-method agreement in their result however; if the data of their series were analyzed, it was clearly apparent that there were differences in the sensitivity and specificity between 64-row MDCT VHSG and X-ray HSG, and so the inter-method agreement will never be $k = 1$ due to different diagnostic value between both examination; Second, in the current study the 64-row MDCT VHSG has overall more sensitivity, specificity, PPV and NPV over the X-ray HSG which made agreement between two studies was high yet not $K = 1$.

There was a significant mean duration time reduction of 20.4 ± 1 min ($P < 0.0001$) in MDCT VHSG when compared with X-ray HSG. This result is consistent with Carrascosa et al. (3) who reported that the mean duration for X-ray HSG was 28 ± 3, whereas for MDDT VHSG was 5 ± 3 min. This significant duration reduction can be explained by difference

Table 3 Agreement between X-ray HSG and MDCT VHSG for uterine pathology, fallopian tube pathology and per patient pathology.

Index	Uterine pathology	Fallopian tube pathology	Per patient pathology
Cohen's kappa (κ)	0.83	0.76	0.75

Table 4 Number and percentage of patients exhibiting different discomfort grade during both X-ray HSG and MDCT VHSG.

Grade of discomfort	X-ray HSG	MDCT VHSG
No discomfort	0 (0%)	9 (36%)
Mild discomfort	7 (28%)	11 (44%)
Moderate discomfort	10 (40%)	5 (20%)
Sever discomfort	8 (32%)	0 (0%)

in the technique of both examination where; the MDCT VHG examination required only a single injection of contrast media for CT acquisition, in contrast to X-ray HSG which required multiple contrast injections and multiple spot radiographs in addition to delayed radiograph for assessment of intra-peritoneal spill and adhesion, all these factors reduced the time of the MDCT VHSG procedure in a significant manner.

It is clearly apparent that MDCT VHSG was a well tolerated and better accepted examination compared to conventional X-ray HSG with less patient discomfort during MDCT VHSG, where 80% of patients referred no or mild discomfort during MDCT VHSG, yet 72% of patients referred moderate or severe discomfort during X-ray HSG. This is consistent with Carrascosa et al. (3–5) which was attributed to many factors; (1) During MDCT VHSG examination no cervical clamping was used and instead of metallic cannula a specially designed well fitted plastic cannula was positioned in the external cervical os producing less patient discomfort. (2) The speed of MDCT VHSG examination reduced discomfort and anxiety. (3) The dilution of contrast media during the MDCT VHSG with less irritation of the peritoneal cavity in contrast to X-ray HSG technique in which none diluted contrast media was used. (4) During MDCT VHSG the patient was made to remain in single position without the need to turn or change her position on the CT table in contrast to X-ray HSG where the patient was made change her position during the examination to obtain the delayed film. These factors were the mean reasons that made the MDCT VHSG a well tolerated and accepted technique. The radiation dose is an important

Table 2 Diagnostic value of X-ray HSG and MDCT VHSG for uterine pathology, fallopian tube pathology and per patient pathology.

Index	Uterine pathology		Fallopian tube pathology		Per patient pathology	
	X-ray HSG (%)	MDCT VHSG (%)	X-ray HSG (%)	MDCT VHSG (%)	X-ray HSG (%)	MDCT VHSG (%)
Sensitivity	90	100	100	100	87	100
Specificity	93.3	100	86	93	80	91
PPV	90	100	85	91	87	93
NPV	93.3	100	100	100	80	100

issue, especially for young females seeking fertility, where the radiation is focused on the ovary and other pelvic structure.

Another important advantage for the MDCT VHSG was the significant dose reduction in comparison to conventional X-ray HSG. In this study, the mean patient effective dose during MDCT VHSG was 3.54 ± 0.6 mSv, less than the 6.13 ± 0.3 mSv of the X-ray HSG with significant radiation dose reduction of 2.59 ± 0.3 mSv ($P < 0.0001$) in MDCT VHSG compared with X-ray HSG. This result is consistent with Carrascosa et al. (3) and Carrascosa et al. (4) series; they also reported that there was significant dose reduction in MDCT VHSG as compared to conventional X-ray HSG with the mean patient effective dose in the MDCT VHSG was 2.58 ± 0.75 mSv, inferior to the 5.13 ± 0.24 mSv of the conventional X-ray HSG with radiation dose reduction of 2.06 mSv ($p < 0.001$). Carrascosa et al. (12) reported also significant radiation dose reduction of 2.75 mSv in 64-row MDCT VHSG when compared with HSG.

The reduction in the radiation dose during the MDCT VHSG was related to the use of automatic tube current modulation during the scan, and using small field of view consist to the region of female uterus, in contrast to X-ray HSG where multiple spot radiographs were taken, in addition to relativity lengthy fluoroscopic time during the procedure. In this study the MDCT VHSG has revealed two ovarian cysts one was simple and the other one was complicated cyst, yet no cervical pathology was detected in current study.

We found that MIP image with thick slab in axial plan provide image similar to conventional X-ray HSG, although MDCT VHSG can provide different MPRs images in sagittal and coronal plane, yet the axial plane alone or with some obliquity in axial images, satisfactory unfold uterus and provide HSG images in most cases which may be attributed to position of AVF uterus laying on empty bladder.

Although Takeda et al. (11) and Akaeda et al. (12) produced virtual endoscopic images by 16-row MDCT to examine patient with submucous myoma after expanding the uterine cavity with CO2, before hysteroscopic myomectomy. Yet the literature focused on evaluation of MDCT VHSG as compared to conventional X-ray HSG and there is a need to compare diagnostic value of virtual endoscopy created by MDCT after injecting diluted contrast media with hysteroscopy.

The MDCT VHSG is painless and safer procedure with low patient radiation dose, and has low risk of complication with possibility of evaluating lumen of female reproductive tract with non invasive virtual endoscopy, in addition to evaluating other pelvic structure; all are considered advantages of MDCT VHSG procedure. Yet the high cost of examination with non availability of plastic cannula and MDCT VHSG examination are main disadvantages of this procedure.

7. Conclusion

On the basis of our results which involved 25 patients evaluated with both 64-row MDCT VHSG and X-ray HSG, we demonstrated that the 64-row MDCT VHSG has a superior diagnostic performance in the assessment of the female reproductive tract; having high spatial resolution with endoscopic views, being more tolerable examination, with less radiation exposure, in addition to its ability to evaluate extra uterine pelvic pathology, which are great advantages of this novel procedure. Further studies with high number of cases are needed to confidently complement and/or substitute MDCT VHSG for X-ray HSG.

Conflict of interest

None.

Acknowledgments

The authors would like to thank Prof. Dr. *Wahid H. Tantawy, Professor of Radiodignosis, faculty of Medicine, Ain Shams University,* as well as Misr Radiology Centre (MRC) and Ain Shams University Radiology Department for helping to perform this work.

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